UTAH GEOLOGICAL SURVEY
a division of
UTAH DEPARTMENT OF NATURAL RESOURCES

Plate 1
Utah Geological Survey Miscellaneous Publication 95-3
Geologic Map of the Richmond Quadrangle

Base map from U.S. Geological Survey
Richmond 7.5' Quadrangle, 1964

SCALE 1:24 000

1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER

CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 10-FOOT CONTOURS

14° 23′
255.7 mills
1995 MAGNETIC DECLINATION
AT CENTER OF SHEET

UTAH
QUADRANGLE LOCATION

Field mapping by McCalpin 1986-88,
and Brummer 1988-89
Revisions by Jon K. King 1993
Lori J. Douglas, Cartographer

GEOLOGIC MAP OF THE RICHMOND QUADRANGLE, CACHE COUNTY, UTAH AND FRANKLIN COUNTY, IDAHO

by

Jon Brummer and

James McCalpin

1995

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Plate 2
Utah Geological Survey Miscellaneous Publication 95-3
Geologic Map of the Richmond Quadrangle

DESCRIPTION OF MAP UNITS

Qlf — Lacustrine fine-grained deposits; undifferentiated levels- *Silt and clay; lake bottom sediments; Bonneville lake cycle; 40 to 50 feet (12 to 15 m) thick.*

Qls$_3$ — Lacustrine sand and silt deposits; Provo level- *Well stratified fine sand and silt; Bonneville lake cycle;< 17 feet (<5 m) exposed thickness.*

Qls$_4$ — Lacustrine sand and silt deposits; Bonneville level- *Coarse sand to fine silt; Bonneville lake cycle; <17 feet (<5 m) exposed thickness.*

Qlg$_3$ — Lacustrine gravel deposits; Provo level- *Cross-bedded cobbles to medium sand; delta-derived longshore drift; Bonneville lake cycle; <17 feet (<5 m) exposed thickness.*

Qlg$_4$ — Lacustrine gravel deposits; Bonneville level- *Cobbles to medium sand; bar and shoreline gravel; Bonneville lake cycle; <35 feet (<10 m) exposed thickness.*

Qdg — Deltaic gravel deposits; post-Provo level- *Pebbles and cobbles in sand matrix; Bonneville lake cycle; <17 feet (<5 m) exposed thickness.*

Qd$_3$ — Deltaic deposits; Provo level- *Pebbles and cobbles in sand matrix; Bonneville lake cycle; <85 feet (<25 m) exposed thickness.*

Qds — Deltaic sand deposits; Provo or post-Provo level- *Fine sand to silt; Bonneville lake cycle; <17 feet (<5 m) exposed thickness.*

Qan — Natural levee deposits of the Bear River - *Fine sand to silt; <17 feet (<5 m) exposed thickness.*

Qal$_1$ — Stream alluvium - *Pebble to cobble gravel in sand and silt matrix; modern floodplain and terrace sediments; <17 feet (<5 m) exposed thickness.*

Qal$_2$ — Stream alluvium - *Pebble to cobble gravel in sand and silt matrix; floodplain and terrace sediments more than 16 feet (5 m) above modern stream level; <17 feet (<15 m) exposed thickness.*

Qaly — Younger stream alluvium - *Pebble to cobble gravel in sand and silt matrix; undivided Qal$_1$ and Qal$_2$ (Holocene) floodplain and terrace sediments; variable thickness but at most <35 feet (<10 m).*

Qal$_3$ — Stream alluvium - *Pebble to cobble gravel in sand and silt matrix; terrace sediments graded to Provo level; Bonneville lake cycle; <17 feet (<5 m) exposed thickness.*

Qal$_4$ — Stream alluvium - *Pebble to cobble gravel in sand and silt matrix; sand lenses; terraces graded to the Bonneville level, Bonneville lake cycle; <17 feet (<5 m) exposed thickness.*

Qal$_5$ — Stream alluvium - *Pebble to cobble gravel; pre-Bonneville lake cycle deposits; <17 feet (<5 m) exposed thickness.*

Qaf$_1$ — Alluvial-fan deposits - *Pebbles and cobbles in sand, silt and clay matrix; locally bouldery; <17 feet (<5 m) exposed thickness.*

Qaf$_2$ — Alluvial-fan deposits - *Pebbles and cobbles in sand, silt and clay matrix; locally bouldery; <17 feet (<5 m) exposed thickness.*

Qap — Pediment-mantle deposits - *Rounded quartzite cobbles and boulders; <35 feet (<10 m) exposed thickness.*

Qac — Undifferentiated alluvium and colluvium - *Unknown thickness.*

Qmc — Hillslope colluvium - *Developed on Tertiary bedrock and pediment-mantle deposits; cobbles and boulders common; <17 feet (<5 m) exposed thickness.*

Qms — Slide, slump and flow deposits - *Unsorted, unstratified; on Tertiary bedrock; variable thickness.*

Tslc — Salt Lake Formation conglomerate - *Mostly quartzite and carbonate clasts in tuffaceous, sandy matrix; exposed thickness approximately 700 feet (213 m).*

Tslt — Salt Lake Formation tuffaceous rocks - *Tuffaceous claystone and ash; exposed thickness up to 500 feet (152 m).*

Ogc — Garden City Formation - *Gray limestone, usually brecciated; not in-place; incompletely exposed.*

Ꞓsc — St. Charles Formation - *Dark gray, brecciated dolostone and basal white to tan quartz arenite; not in-place; incompletely exposed.*

Ꞓu? — Ute(?) Formation - *Gray oolitic limestone; isolated block not in-place.*

Ꞓl? — Langston(?) Formation - *Olive-tan shale and gray limestone; isolated block not in-place.*

Ꞓls? — Cambrian(?) limestone - *Gray limestone; isolated block not in-place.*

Ꞓgc — Geertsen Canyon Quartzite - *Pink, tan, olive, and white quartzite with interbedded conglomerates; about 2,500 feet (762 m) thick.*

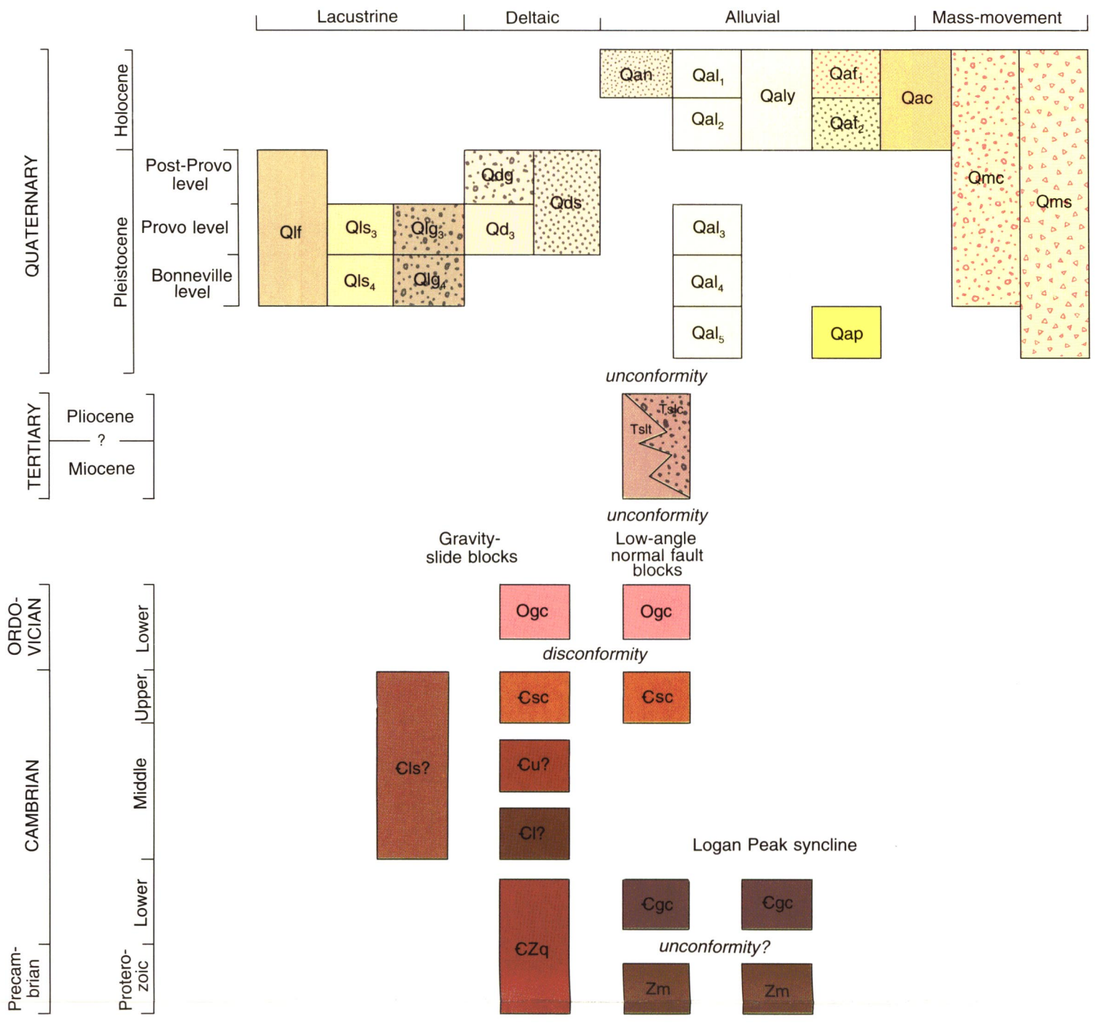
Zm — Mutual Formation - *Red, purple , and purple-white banded quartzite with interbedded conglomerate; about 3,000 feet (914 m) thick.*

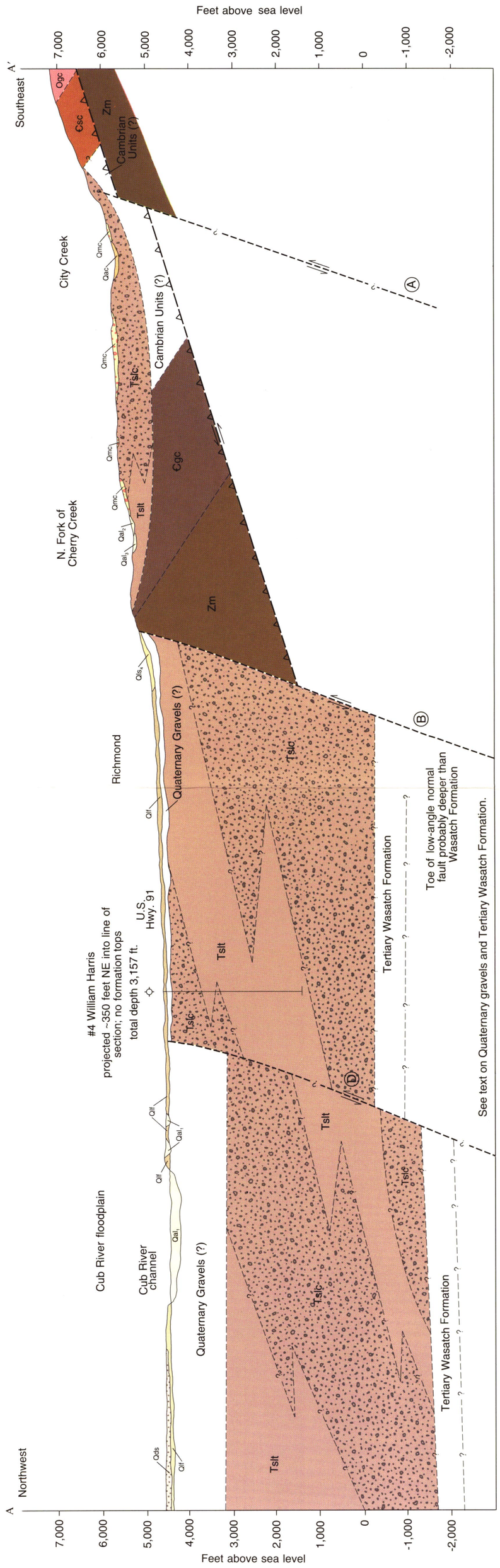
ꞒZq — Undifferentiated Proterozoic and Cambrian quartzite - *Large blocks, slabs, and boulders; not in-place.*

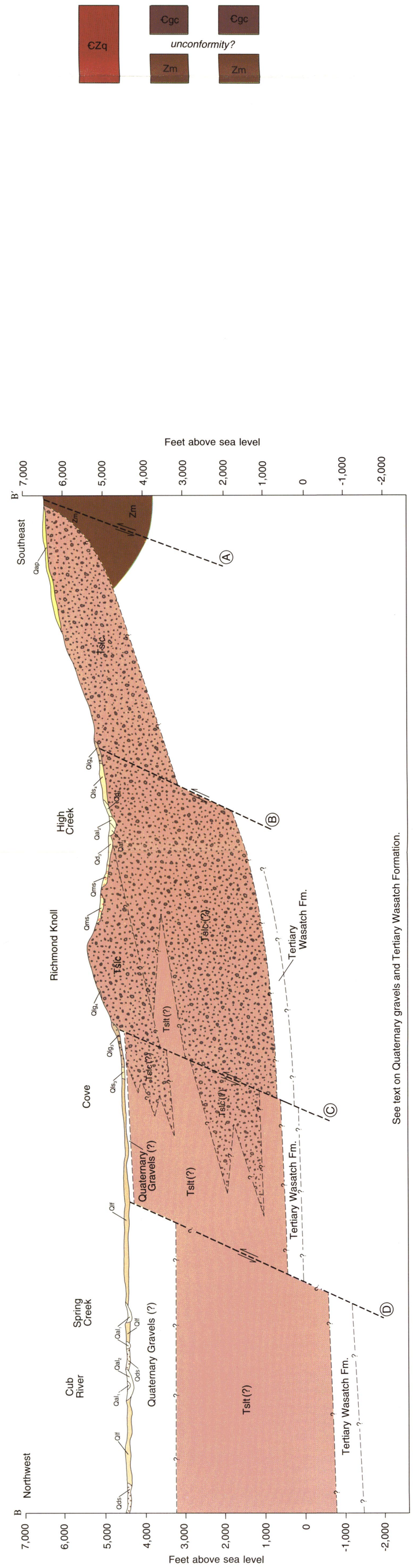
MAP SYMBOLS

- Thrust fault - *solid teeth on hanging wall, dashed where approximately located, arrow and number indicate dip direction and degree*
- High-angle normal fault - *bar and ball on downthrown side, dashed where approximately located, dotted where concealed, queried where existence uncertain; arrows show direction of movement on cross sections; circled letter denotes identification for discussion in text*
- Low-angle normal fault - *open teeth on hanging wall, dashed where approximately located*
- Contact - *dashed where approximately located, dotted where concealed, queried where existence uncertain*
- Trace of gravity-slide-block surface - *hachures on block, dotted where concealed such that locations are diagrammatic*
- Bonneville-level shoreline
- Provo-level shoreline
- Strike and dip - *broken where measurement uncertain*
- Locality - *mentioned in text; Tslt-claystone*
- Spring
- Gravel pit - *larger pits have hachured outlines; numbers correspond to those in table 2*
- Line of cross section
- Oil and gas exploration well - *dry hole, abandoned*

CORRELATION OF MAP UNITS







		FORMATION		SYMBOL	EXPOSED THICKNESS in feet (meters)	LITHOLOGY	COMMENTS
Tertiary	Miocene-Pliocene	Salt Lake Formation	conglomerate	Tslc	~700 (213 m)		
			tuffaceous rocks	Tslt	~500 (152 m)		Unconformity
Ordovician	Lower	Garden City Formation		Ogc	1,405 (428 m)		Brecciation
							Disconformity
Cambrian	Upper	St. Charles Formation		Ꞓsc	1,015 (309 m)		Worm Creek member
							Low-angle normal fault
Cambrian	Lower	Geertsen Canyon Quartzite		Ꞓgc	2,500 (762 m)		Unconformity (?)
Precambrian	Proterozoic	Mutual Formation		Zm	3,000 (914 m)		Base not exposed

Pre-Tertiary stratigraphy adapted from Mendenhall (1975) and Galloway (1970).